Comprehensive Atmospheric Mapping, Aircraft Detection and Signature Spoofing via Controlled Directionally Inverse Helical IR Pulsed LASER Interaction for Beacons-Without-Bulbs Functionality

15 November 2023
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Introduction

Improved weather forecasting demands the ability to create the most accurate map of current atmospheric conditions. Deploying and maintaining meteorological sensors, particularly at high altitudes and remote locations such as over oceans, is costly. Spatial and temporal gaps in observations are the primary protagonist of error propagation in predictive weather models.

Conventional LASERs can be used creatively, as in the Aeolus system, to measure certain aspects of atmospheric conditions, but cannot currently be used to measure *all* relevant atmospheric conditions in all places and at all times. Temperature, pressure, moisture content, wind speed and wind direction must all be known in order to create hyper-accurate weather models.

The critical elements of temperature and pressure could be inferred via analysis of distortions to light from IR beacons shone from every possible three-dimensional position within the atmosphere.

Abstract

Rather than deploying physical sensors or emitters into the atmosphere, ground and sea-based (gyroscopically stabilized in the case of sea-based) helical IR LASERs emitting scatter-resistant light could be made to operate in tandem with orbiting platforms emitting the same sort of light toward ground stations so as to cause beams to overlap while moving in opposing directions.

As helical light resists scattering, if an influence were to strip it of its property of helicity in mid-flight, it would begin to behave as ordinary light, becoming highly diffuse. In short, two helical beams moving in opposing directions would, at the point of collision, mutually de-helicize and would scatter in all directions, behaving very much as if a light emitter had been lofted on a balloon to that point in the atmosphere. Advanced timing control would enable the point of collision to be controlled with high accuracy, allowing bursts to be generated at predictable three-dimensional spatial locations in the atmosphere. Analyzing the differences between light originating from these various points with relation to one another can be used to reveal the thermal and barometric attributes of the atmosphere at those points. Wind speed and direction can be inferred once temperature and pressure are known.

Large numbers of observations could be made in very short periods of time and with a sufficient number of supporting nodes (between 80-150 small satellites in LEO and a comparable number of ground stations) would enable temperature and pressure estimates to be generated with high accuracy at a resolution of less than 1 meter for every part of the atmosphere in three dimensions.

Conclusion

Not only would weather models of unprecedented accuracy be made possible through used of this technique, but the ability to generate light bursts that seemingly originate from "mid-atmosphere" would enable the illumination of low-observable aircraft not detectable via other methods. Ibid. previous publication regarding disguised jamming sources, microwave-band EM may be helicized and de-helicized controllably using either two helicized beams or combinations of helical and soliton beams so as to disguise the true source of jamming. Novel is the ability to helicize light in addition to microwave-band EM.

These converging beams could also be used to emulate the IR exhaust signatures of known aircraft in order to deceive IR-based early warning systems or to confuse Close-In-Weapons-Systems during actual attacks. This sort of approach would likely be more effective and practical than the concept of utilizing "pop-out drones" that deploy in the terminal phase from anti-ship missiles in order to emit IR jamming toward enemy CIWS as in LRASM et al.